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VS01

SYSTEMS MANAGEMENT OFFICE (SMO) WORK PROCESS Draft 1

APPROVING AUTHORITY

NAME	TITLE	ORG	DATE
Dr. Dale Thomas	Director Systems Management Office	VS01	10/24/2002

CHECK THE MASTER LIST-
VERIFY THAT THIS IS THE CORRECT VERSION BEFORE USE

DOCUMENT HISTORY LOG

Status (Baseline/ Revision/ Canceled)	Document Revision	Effective Date	Description
BASELINE	SMO-OI-01	12/6/1999	Baseline of Work Instruction
REVISION	A	3/8/2000	Revised Paragraph 9.0 to add definitions for the ECO, SEO and Export Control quality records.
REVISION	B	8/30/2000	3.0 Applicable Documents: Deleted MWI 2190.1 and replaced with MPD 2190.1 and MPG 2190.1 Paragraph 5.1.1: Replaced "..MPG 7100.1 proposal.." with "..MPG 7120.1.." Paragraph 5.4: Deleted "..MWI 2190.1." and replaced with "..MPD 2190.1 and MPG 2190.1." in the first sentence. Deleted "..MWI." and replaced with "..respective MPD and MPG." in the second sentence. Paragraph 5.5: Replaced "..NPG 7120.5." with "..MPG 7120.1.." Paragraph 5.5.1: Changed reference from MPG 7100.1 to MPG 7120.1 and removed sentences explaining verbage within MPG 7100.1 which has been rewritten. Paragraph 5.5.2: Deleted due to rewrite of MPG 7120.1 and MPG 7100.1 Paragraph 5.5.3: Deleted last sentence of second paragraph which discussed SMO reporting stop light findings.
REVISION	C	7/27/2001	Cover Sheet: Replaced Robert O. McBrayer with Axel Roth Paragraph 1a - 1k: Updated to reflect changes in SMO Charter Paragraph 3.0: Deleted MPG 1050.1, MPD 1150.1 Charter MC-08, MWI TBD. Added SMO-OI-02 Paragraph 4.1: Updated Multiple Definitions Paragraph 4.2: Added Acronyms Section Paragraph 5.0: Replaced 3) ISE with 3) MSFC PMC/MSFC Lead Center PMC Secretariat Paragraph 5.1: Clarified wording and added appropriate punctuation Paragraph 5.1.1: Changed Marshall Directives System to Marshall Management System (MMS) Paragraph 5.1.2: Changed MDS to MMS and issues to processes and guidelines Paragraph 5.1.2.D: Changed palce to media Paragraph 5.1.2.F: Changed MDS to MMS Paragraph 5.1.3: Added program/project management and export control to tools Paragraph 5.1.4.B: Changed vender to vendor and modified structure of sentence. Paragraph 5.1.4.G: Changed six to 6 and one to 1. Paragraph 5.1.6.A: Changed structure of sentence from reading both 1) and 2) to 1) or 2) Paragraph 5.2: Modified structure of sentence. Paragraph 5.3: Replaced ISE section with MSFC PMC/MSFC Lead Center PMC Secretariat section Paragraph 5.4: Added MMS documents Paragraph 5.5.3: Changed Lead to Chairperson Paragraph 5.5.4: Changed required to requested Paragraph 5.5.5: Removed requirement for Co-Chair Paragraph 5.5.6: Clarified Chairperson responsibilities and Removed requirement for Co-Chair signature Paragraph 5.5.8: Added the preparation of recommendations Paragraph 5.5.9: Added paragraph to require Chairperson to status the SMO Director and refer to

			new MPG for instruction on statusing the MSFC PMC Paragraph 9: Added the identification of PMC Secretariat records Appendix A.1: Changed MWI 2190.1 to MPD 2190.1. Added MPG 2190.1 to List. Modified the title of MPG 8060.1 Appendix A.2: Added MSFC-HDBK-3173 to List Appendix A.3: Updated DRD List Appendix B Paragraph 5.3: Changed MSFC PMC to GPMC Appendix B Paragraph 6.2: Changed MSFC PMC to GPMC Appendix B Paragraph 6.3: Changed MSFC PMC to GPMC
REVISION	D	2/28/2002	Paragraph 1.0 Purpose, Item J: Replaced “MM 1107.1” with “MPG 1100.1” Paragraph 3.0 Applicable Documents: Replaced “MM 1107.1” with “MPG 1100.1” Paragraph 3.0 Applicable Documents: Added MPG 7120.4 Paragraph 5.3: Changed MPG TBD to MPG 7120.4 Paragraph 5.5.2: Deleted “per MPG TBD.” in second paragraph. Paragraph 5.5.9: Changed MPG TBD to MPG 7120.4
REVISION	E	10/24/2002	Cover Sheet: Replaced Axel Roth with Dr. Dale Thomas 9. Records: Changed retention time for Export Control Records from 6 years to 5 years. Appendix B: Removed “Under Review” From Title Page Appendix C: Removed “Under Review” From Title Page

1. PURPOSE

The purpose of this issuance is to document the work instructions for conducting the following responsibilities assigned to the Systems Management Office (SMO):

a. Reviews and evaluates Center programs/projects and provides project management and systems engineering guidance in the formulation stage.

b. Develops MSFC policy for and conducts Independent Assessments (IA), Non-Advocate Reviews (NAR), Independent Annual Reviews (IAR), and participates in program/project reviews. Develops MSFC policy for Red Team reviews.

c. Provides to the Center Director an independent evaluation of programs/projects progress toward meeting technical requirements within cost and schedule commitments.

d. Serves as a member and provides the Secretariat for the MSFC Program/Project Management Council (PMC), Microgravity Research PMC, and Space Transportation PMC.

e. Supports the Agency Chief Engineer and Agency Independent Program Assessment Office (IPAO) by participating in reviews of other NASA Center’s projects and serving as the point of contact for providing experts to support external review requests.

f. Directs the development of standard processes, tools, and guidelines for the program/project management, systems engineering, cost engineering, and export control functions.

g. Defines and coordinates Centerwide training/mentoring for program/project management and systems engineering practices and processes.

h. Prepares independent engineering cost, schedule, economic, and risk analyses for MSFC programs/projects.

i. Develops and maintains an Agency database of historical cost, schedule, and technical data from completed and ongoing programs/projects. Develops NASA-wide cost and schedule estimating techniques. Provides supporting software, documentation, training, and regular updates.

j. Leads the Center's Export Control function.

These responsibilities are outlined within the SMO Charter, MPG 1100.1, Charter Number VS01.

2. APPLICABILITY

This issuance is applicable to all personnel working within the SMO.

3. APPLICABLE DOCUMENTS

MPG 1100.1 Charter VS01	Systems Management Office Charter
MPD 2190.1	MSFC Export Control Program
MPG 2190.1	MSFC Export Control Program
MPG 7120.1	Program/Project Planning
MPG 7120.4	MSFC Program Management Council (PMC)
NPG 7120.5	NASA Program and Project Management Processes and Requirements
SMO-OI-02	Development and Control of Systems Management Offices Organizational Issuances
SMO-OI-03	Control of Quality Records

4. DEFINITIONS & ACRONYMS

4.1 DEFINITIONS

Engineering Cost - the estimation of project life cycle costs (LCC) and schedules including associated activities such as cost/schedule uncertainty analyses, cost-benefit analyses, cost trade studies, and other business and economic evaluations.

Export Control – the process that ensures exports to foreign parties are consistent with the regulations defined by the Department of State, Department of Commerce, Nuclear Regulatory Agency, and other Government agencies.

Independent Evaluation – an assessment of a program/project conducted by non-advocates of the program/projects to evaluate the ability of the program/project to meet its technical and programmatic commitments.

Program Management – the overall decision-making function responsible for the activities within an Enterprise having defined goals, objectives, requirements, funding levels, and consisting of one or more projects.

Project Management – the overall decision-making function responsible for the activities within a particular effort having defined goals, objectives, requirements, LCC, and a beginning and end.

Systems Engineering – the interdisciplinary approach to technically integrate the technical efforts of people, products, and processes in the development of systems to satisfy customer needs.

Systems Management – the overall decision-making function, considering performance, cost, schedule and risk, in the development of systems to satisfy customer needs.

4.2 ACRONYMS

AA	Associate Administrator
ACEA	Assistant Center Export Administrator
CaER	Customer and Employee Relations
CEA	Center Export Administrator
CER	Center Export Representative
ECIS	Export Clearance Information Sheets
ECO	Engineering Cost Office
GPMC	Governing Program Management Council
IA	Independent Assessment
IAR	Independent Annual Review
IPAO	Independent Program Assessment Office
LCC	Life Cycle Cost

MMS	Marshall Management System
NAR	Non-Advocate Review
OJT	On The Job Training
OPR	Office of Primary Responsibility
PAPAC	Providing Aerospace Products and Capabilities
PMC	Program/Project Management Council
SEO	Systems Engineering Office
SMO	Systems Management Office

5. INSTRUCTIONS

The responsibilities of the SMO are depicted in Figure 1.

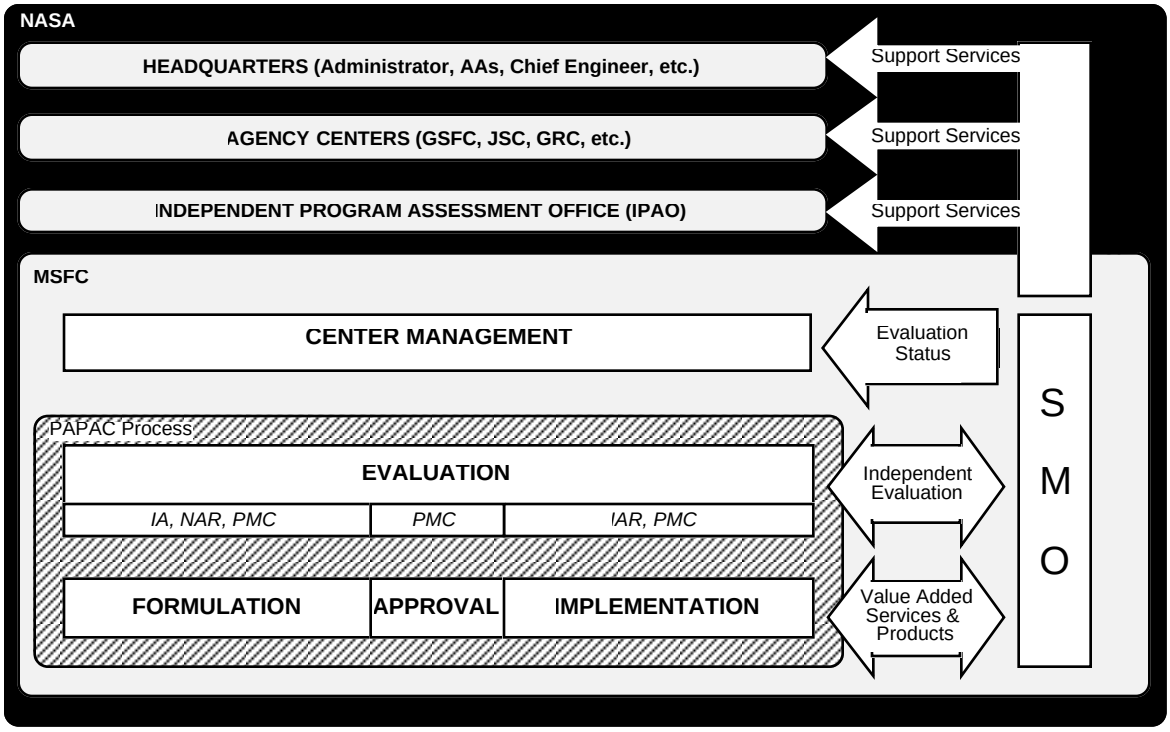

Figure 1. SMO Organizational Responsibilities.

These responsibilities can be broken down into the following three primary work processes in addition to two work functions that the SMO has been assigned the Center's Lead role:

1) Value Added Services & Products
2) Other Agency Support Services

3) MSFC PMC/MSFC Lead Center PMC Secretariat
4) Export Control Lead
5) Independent Evaluation

5.1 VALUE ADDED SERVICES AND PRODUCTS

The SMO will make guidance and support available to programs/projects that are providing aerospace products and capabilities (PAPAC) to assist in their implementation of NPG 7120.5. SMO will also strive to develop consistency across product lines for program/project management and Center systems engineering functions, including systems management guidance, export control, and program/project cost forecasting. The subsequent paragraphs outline those areas where the SMO provides such services and products to the program's/projects.

5.1.1 Provides Guidance In The Formulation Stage

As new work is acquired at the Center, via the MPG 7120.1 process or directed by Center Management, the SMO will assess and provide guidance and recommendations to the programs/projects during the formulation stage and their effort to obtain approval. As programs/projects start developing the recommended PAPAC documentation and data (e.g. Program/Project Plans, Risk Management Plans, etc.) outlined in NPG 7120.5, the SMO will review and provide guidance on its development. The SMO will also provide guidance and recommendations to the programs/projects with respect to the applicable systems engineering and program/project management instructions contained in the Center's ISO program, The Marshall Management System (MMS).

5.1.2 Develop and Maintain Systems Engineering and Program/Project Management Processes and Guidelines

The SMO will direct the development of, and maintain as the Office of Primary Responsibility (OPR), crosscutting Systems Engineering and program/project management processes and guidelines for the Center. These processes and guidelines are in the form of the MMS documents, as well as various Systems Engineering and program/project management handbooks. A listing of these processes and guidelines can be found in Appendix A. The

process for addressing Systems Engineering and program/project management processes and guidelines is shown in Figure 2.

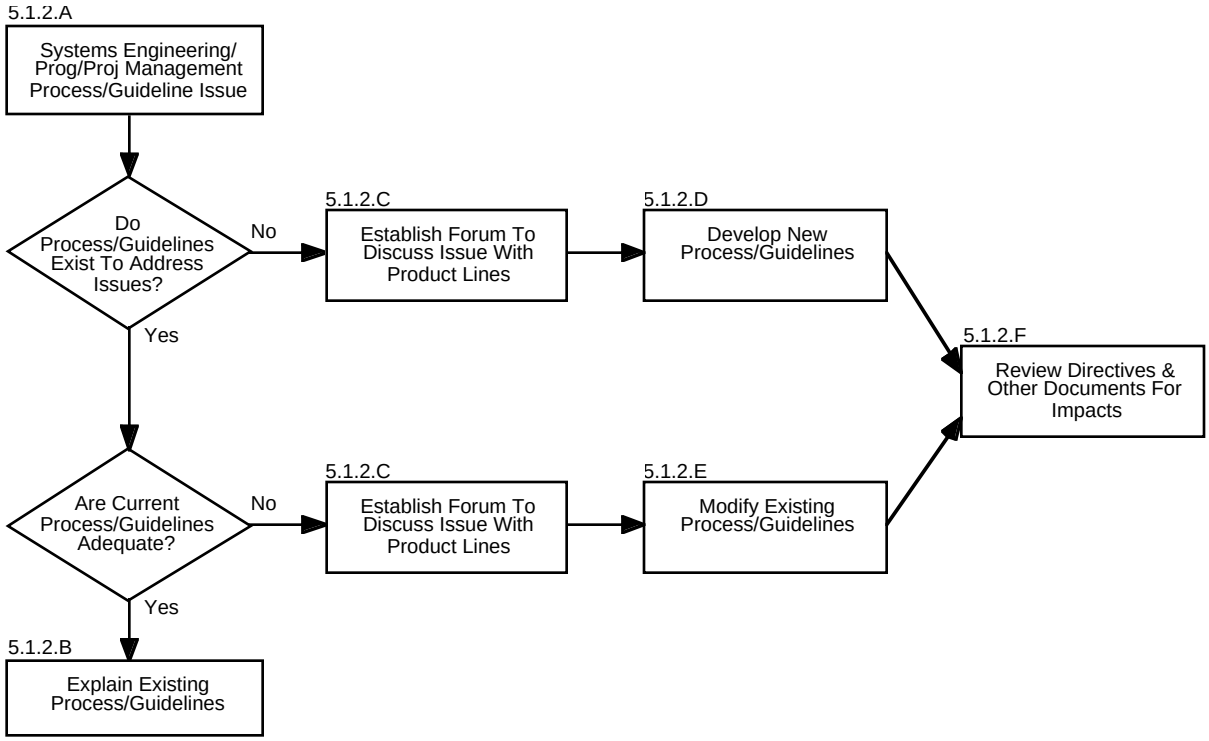

Figure 2. Develop and Maintain Systems Engineering and Program/Project Management Processes and Guidelines.

5.1.2.A. Issues, changes, or additions to the Systems Engineering or program/project management processes/guidelines shall be initiated through the SMO. Issues are identified from the programs/projects or the SMO day-to-day operations with the programs/projects.

5.1.2.B. After reviewing the issue, the SMO will determine if any process/guidelines exist to address the issue or if the process/guidelines do exist, are they adequate to address the issue. If the process/guidelines do exist and they are adequate, then the issue can be resolved by communicating and explaining the process/guideline to the appropriate party.

5.1.2.C. For those issues that arise that are not currently addressed in any process/guideline or if the process/guideline needs modification, then the SMO will establish a forum to include participation from the appropriate Product Line personnel. This forum will provide working group discussions and feedback from those organizations that are implementing the processes and guidelines at the Center. This forum will also provide the mechanism for getting feedback on new practices and processes established.

5.1.2.D. If the resolution of the issue is to develop a new process or guideline, the SMO will discuss with the forum and determine the appropriate media (e.g. directive, handbook) to record any new process or guideline at the Center. The SMO will also ensure communication of the new process or guideline back to the Product Line organizations.

5.1.2.E. If the resolution of the issue is to modify an existing process or guideline, the SMO will update the documented systems engineering or program/project management process or guideline and ensure communication of the change back to the Product Line organizations.

5.1.2.F. For any systems engineering or program/project management process or guideline that is created or revised, the SMO will review existing MMS documents as well as various handbooks for impacts and submit necessary changes into the system.

5.1.3 Develop Systems Management Tools

The SMO will coordinate and direct the development of standard systems management tools, which include program/project management, systems engineering, cost engineering, and export control tools. The process for the coordination/development of such tools is shown in Figure 3.

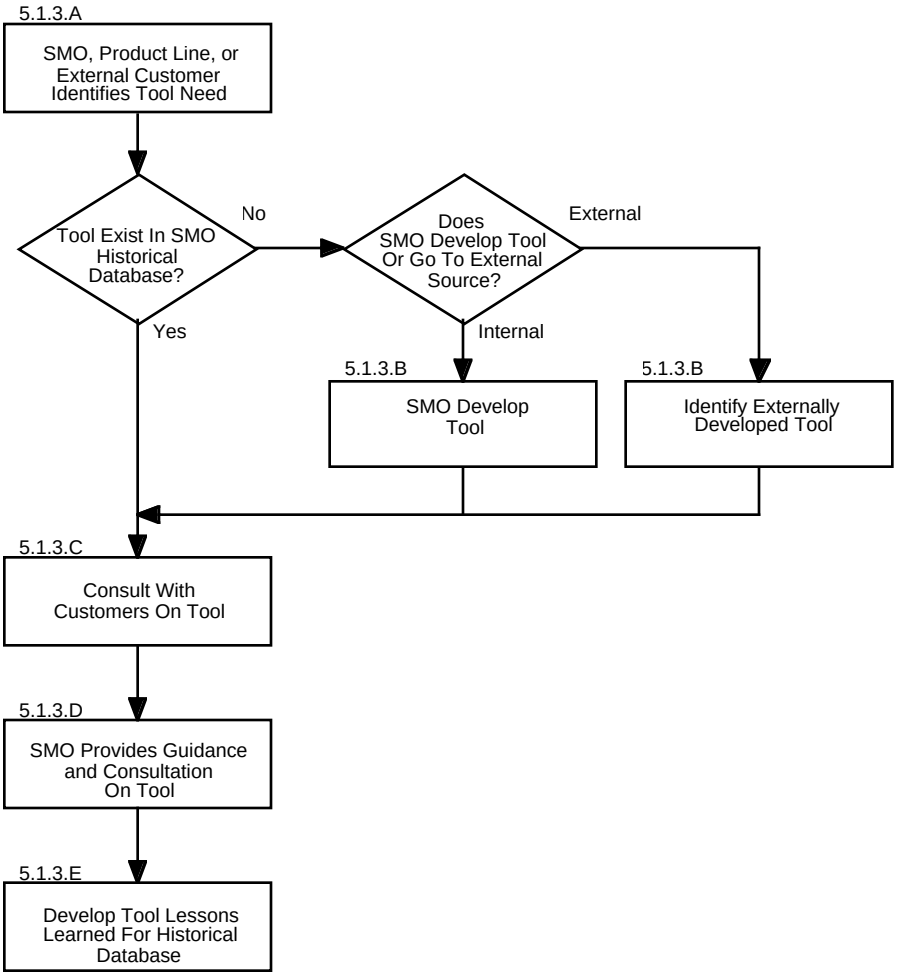

Figure 3. Develop Systems Management Tools.

5.1.3.A. The identification for the need of a systems management tool can be initiated by the Product Lines, the SMO, or by an external customer. After a need for a tool is identified, the SMO will investigate to determine if a tool already exists in the SMO historical database, if SMO needs to initiate development of the tool internally, or if the SMO needs to research externally for such a tool.

The SMO will constantly be researching and investigating those existing tools being used by other NASA Centers, industry/private sector, etc., and identify a need or

use within MSFC and document the tool within the SMO historical database.

5.1.3.B. For those internally developed tools, the SMO will assign a lead or team to work on the effort. The tool will be developed or an existing tool modified to meet the customer's needs. A developer responsible for maintaining configuration control and support of the tool will be identified and all information pertaining to the tool will be recorded in the SMO's historical database for future use and reference. For an externally developed tool, a developer responsible for maintaining configuration control and support will be identified.

5.1.3.C. After development or research of the tool, the SMO will provide to the customer the background information (i.e. cost, training needed, hardware required, manpower, etc.) needed to implement the tool.

5.1.3.D. During implementation of the tool by the customer, the SMO will provide guidance and consultation as needed by the customer to ensure Center practices and guidelines are being maintained.

5.1.3.E. As the program/project progresses, the SMO will monitor and initiate lessons learned, in the area of the tool being implemented, which will be recorded in the SMO's historical database.

5.1.4 Manage Requirements for Centerwide Systems Engineering and Program/Project Management Training/Mentoring

The SMO will define the requirements for training and mentoring of systems engineering and program/project management practices and processes at MSFC. The Customer and Employee Relations (CaER) organization will implement these requirements with the guidance and support of the SMO. This training/mentoring can be established through formal course training as well as informal on-the-job training (OJT)/mentoring within the SMO. The process for addressing formal course training is shown in Figure 4.

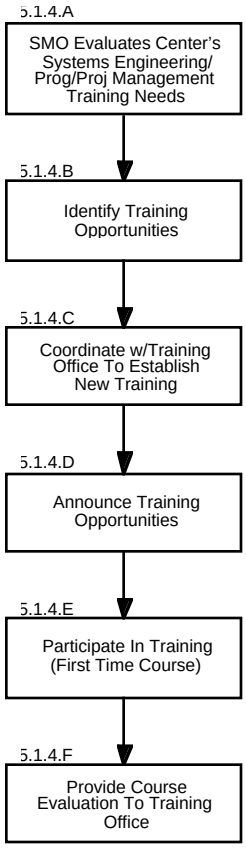

Figure 4. Formal Systems Engineering/Management Course Training.

5.1.4.A. The SMO will evaluate those currently offered Systems Engineering/Management courses at the Center and also coordinate with those organizations within the Product Lines to determine needed courses for training at the Center.

5.1.4.B. Those courses that are needed or desired will be researched to determine opportunities for training. The training opportunities can arise through vendor proposals, training announcement mailings, SMO personnel experienced training, and other related media.

5.1.4.C. Once a candidate training course has been found, the SMO will coordinate with the Center's Training Office to establish the training course for MSFC personnel participation.

5.1.4.D. The training course will be announced via the Training Office's announcement process, as well as the SMO communicating the announcement to the Systems Engineering/Management organizations within the Product Lines.

5.1.4.E. For first time offerings of a new Systems Engineering/Management course, the SMO personnel will participate in the course to obtain knowledge of the course's agenda and ability to teach the desired skills and information.

5.1.4.F. After the course, the SMO will coordinate with the other course attendees to determine the benefit of the course. SMO will then make a final evaluation and recommendation back to the Training Office for continuing or discontinuing the course in the Center's Systems Engineering/Management curriculum.

The process for addressing informal OJT/mentoring within the SMO is shown in Figure 5.

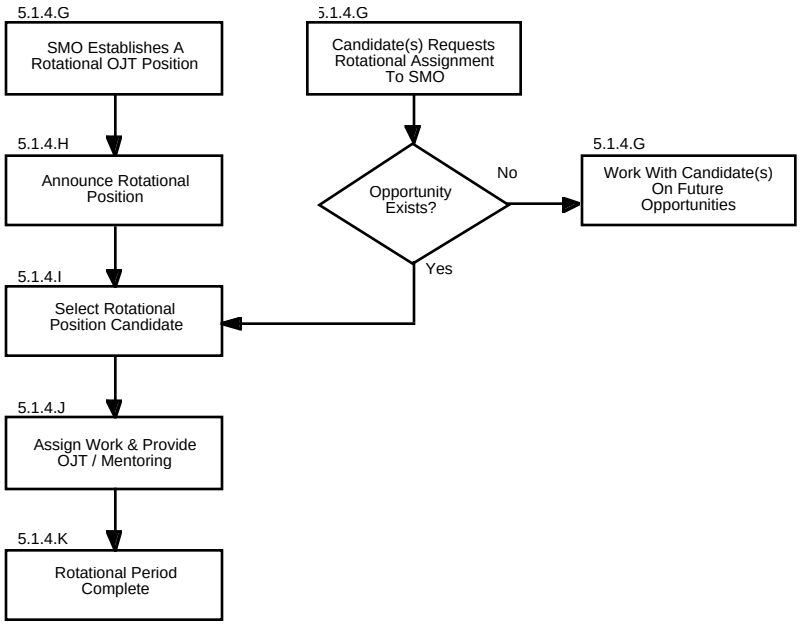

Figure 5. Informal SMO OJT/Mentoring.

5.1.4.G. The SMO will establish any rotational positions via the job position announcement process at MSFC. The length of time (e.g. 6 month, 1 year, etc.) for the rotation position will be determined by the SMO. The SMO will work with potential candidates requesting rotational assignments to the SMO and coordinate their requests with any potential position announcements

5.1.4.H. The rotational position will be announced through the Personnel Office and applicants who are interested will follow the necessary procedures to apply.

5.1.4.I. Candidate(s) will be selected and detailed to the SMO for a temporary rotational position.

5.1.4.J. During the rotational period, the candidate will be assigned work assignments commensurate with his/her job skills and follow the SMO work processes for conducting the work.

5.1.4.K. At the end of the rotational period, the candidate will return back to his/her organization and SMO will provide job performance appraisal for the time spent within the SMO.

5.1.5 Crosscutting Systems Engineering / Management Forum

The SMO will establish an MSFC forum to address crosscutting program/project management and systems engineering experiences and practices for discussion and potential creation of new Centerwide processes/practices.

This forum will include participation from program/project management teams, the Product Line personnel and Center management if needed. This will provide discussions and feedback from those organizations responsible for implementing programs and projects and the systems engineering function.

Issues can originate from programs/projects, Center management, the SMO, the IPAO, or anonymous source and should be brought to the attention of the SMO Director. A lead from the SMO will then be selected to mediate the resolution. After a resolution is

reached, the SMO will document the resolution and insure communication of the resolution back to the Product Lines.

5.1.6 Develops and Maintains Agency Historical Database

The SMO will develop a historical database of cost, schedule, and technical data from past and on-going programs/projects. The database will provide a central repository of systems management data. The process for collecting and maintaining the data will follow the process outlined in Figure 6.

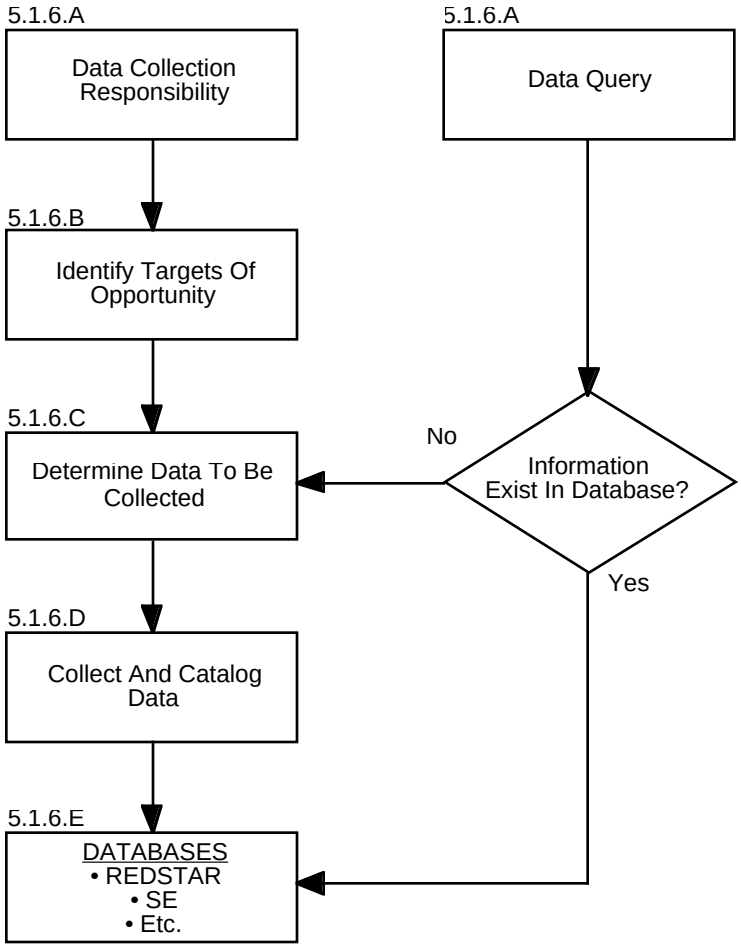

Figure 6. Develops/Maintains Agency Historical Database.

5.1.6.A. Data collection will be initiated in one of two ways: (1) as part of the SMO responsibility to develop and maintain the historical database, or (2) in response to a query that needs specific data for an SMO function (e.g., cost analyses, management guidance).

5.1.6.B. As part of the effort to develop and maintain the database, the SMO will establish the criteria for determining and prioritizing targets for data collection. Targets of opportunity include such organizations as NASA, Air Force, commercial, and foreign government aerospace programs/projects.

5.1.6.C. The data to be collected and archived will be determined by the SMO. Data collected will include such items as program/project histories, lessons learned, cost/schedule/technical data, and milestone and review cycle data.

5.1.6.D. The SMO will determine if the data is to be collected on a periodic basis, recurring basis, or as a one-time special request. Once collected, the data will be catalogued into the appropriate SMO designated database(s).

5.1.6.E. The SMO will determine the number and types of databases (e.g. REDSTAR, Systems Engineering, etc.) to develop and maintain. Databases will be added and consolidated as needed to support the systems management function. All database development and maintenance activities will be performed under the SMO guidance and approval. The databases will be available to US Government and other approved users.

5.1.7 Prepares Independent Engineering Cost, Schedule, and Economic Analyses for MSFC Programs/Projects

The SMO will prepare independent engineering cost, schedule, and economic analyses through its Engineering Cost Office (ECO). The ECO provides this service to promote credible resource estimates by programs/projects and to support the independent evaluation process. The process for providing independent

engineering cost, schedule, and economic analyses for MSFC programs/projects is shown in Figure 7.

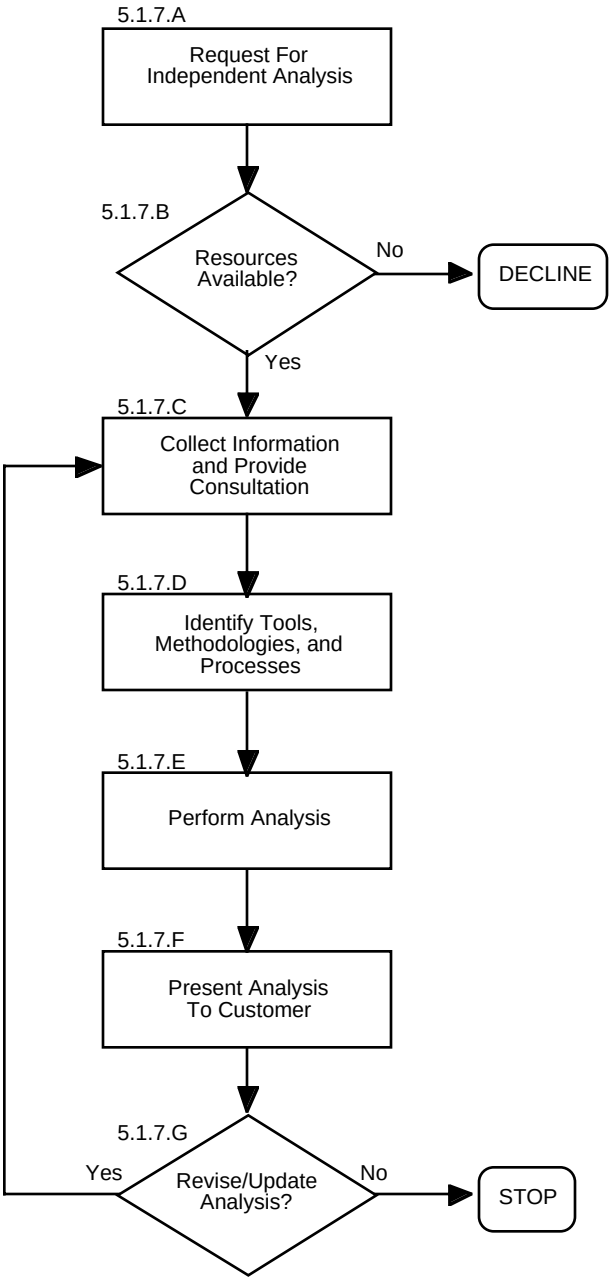

Figure 7. Performs Independent Engineering Cost, Schedule, and Economic Analyses for MSFC Programs/Projects.

5.1.7.A. A request is made to the ECO Manager to perform an independent analysis. This request may come from any MSFC program/project, product line directorate, review team lead, or the Center Director.

5.1.7.B. A determination is made by the ECO Manager if sufficient personnel resources are available to perform analysis. If resources are available, a lead analyst is assigned.

5.1.7.C. Information is collected from the customer to enable the analysis. Includes, but not limited to, requirements, ground rules, assumptions, and data. In addition to collecting information, the analyst(s) may work as a cost consultant and assist the customer in finding the most cost-effective solutions.

5.1.7.D. The analyst(s) identify the tools, methodologies, and processes necessary to perform the analysis. May require development of unique tools, processes, etc. dependent upon customer requirements.

5.1.7.E. The analyst(s) performs the analysis and documents results based on customer requirements and information; using the previously identified tools, processes, and methodologies.

5.1.7.F. Results are presented to the customer in written form, either electronically or hardcopy. Presentation formats include, but are not limited to, reports, viewgraph presentations, and e-mails.

5.1.7.G Customer may request revisions or updates to the analysis. The preparation of cost, schedule, and economic analyses lends itself to an iterative process. The process ends when customer takes final delivery of results or otherwise informs the ECO that no further work is required.

5.2 OTHER AGENCY SUPPORT SERVICES

The SMO will support other Agency organizations (e.g., the IPAO, Agency Chief Engineer, Agency Associate Administrators (AA), NASA Centers, etc.) external to the Center that request SMO

manpower. The request for SMO support will be addressed to the SMO Director. The SMO will assess the request for manpower or needed task and determine needed skills against those within the SMO as well as at the Center. Once the manpower/skill assessment is performed, the SMO Director will respond to the requesting organization as to SMO's ability, or inability, to support the effort. The process for supporting services performed by the ECO of the SMO to develop NASA-wide cost and scheduling techniques is described in the following paragraph.

5.2.1 Develops NASA-Wide Cost and Schedule Estimating Techniques

The SMO will develop cost and schedule estimating techniques for NASA through the ECO. The ECO develops, distributes, maintains, and updates these techniques under its own initiative and at the request of the IPAO. These techniques are used in the performance of independent cost, schedule, and economic analyses (Paragraph 5.1.7). The process for developing the NASA-wide cost and schedule estimating techniques is illustrated in Figure 8.

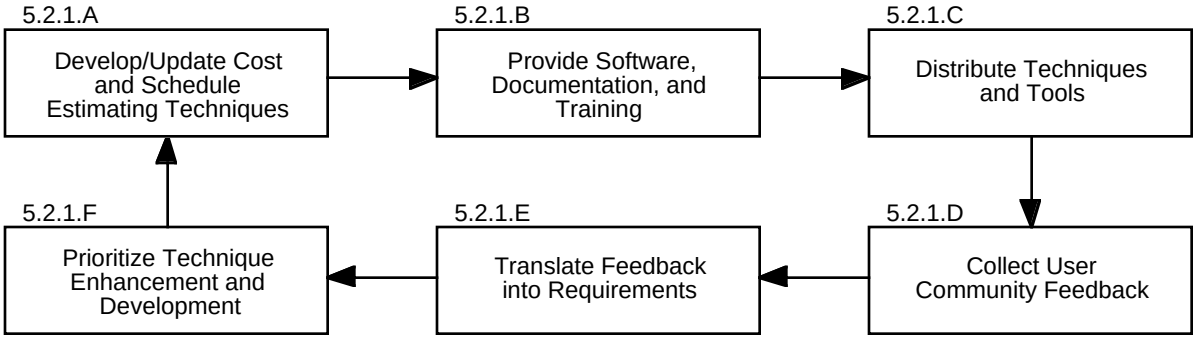

Figure 8. Develops NASA-Wide Cost & Schedule Estimating Techniques.

5.2.1.A. The ECO directs the development of cost and schedule estimating techniques using the prioritized requirements from 5.2.1.F.

5.2.1.B. The ECO ensures that the techniques are automated, documented, and user training programs are developed.

5.2.1.C. The ECO distributes the techniques and tools to the user community within the stakeholder organizations (NASA, Air Force, etc.). The user community includes, but is not limited to, cost and schedule professionals, the IPAO, and program/project office personnel. Distribution includes the model software, documentation, and training.

5.2.1.D. User feedback on the cost and schedule estimating techniques is collected. This feedback is captured and used to guide the ECO in tool/techniques development and enhancement. Collection methods may include but are not limited to informal surveys, user questionnaires, and user forums.

5.2.1.E. The feedback received from the user community is translated into requirements for technique development and enhancement. The various stakeholder organizations are involved in this process.

5.2.1.F. The requirements are prioritized for the development of new tools and the enhancement of existing tools based on feedback from the user community and availability of resources, both civil service and contractor. Organizations with a vested interest in the technique development or enhancement may be asked to participate.

5.3 MSFC PMC/MSFC LEAD CENTER PMC SECRETARIAT

The SMO will provide the Secretariat for the MSFC PMC and the two Lead Center PMCs, (Microgravity and Space Transportation). The individual functions and responsibilities of the Center’s PMC Secretariat are described in MPG 7120.4.

5.4 EXPORT CONTROL LEAD

The SMO will lead the Center's Export Control function as defined in MMS documents MPD 2190.1 and MPG 2190.1. The individual functions that will be performed by the SMO are also described in the respective MPD and MPG.

5.5 INDEPENDENT EVALUATION

The SMO will provide an independent evaluation of selected programs/projects for compliance with MPG 7120.1 and the continuing ability of the program/project to meet its technical and programmatic commitments. As established in the PAPAC Process of NPG 7120.5, the independent evaluation activity will be applied throughout the life cycle of the programs/projects and consists of the planning and conducting of reviews and assessments during the formulation and implementation phases.

5.5.1 The potential new work for the SMO to perform independent evaluations will begin in the Center's program/project planning process of MPG 7120.1.

5.5.2 The SMO independent evaluation work will predominantly occur as a result of the program's/project's evaluation reviews (i.e. IA, NAR, IAR) identified in their Program/Project Plan.

The SMO independent evaluation work will also occur via assessment samplings of programs/projects as they periodically report their program/project metrics (e.g., "stop light chart"). The assessment sampling of programs/projects will be selected based on criteria such as programs/projects indicating negative trends in their metrics reporting or as requested by Center Management.

5.5.3 The SMO Office Managers (i.e. Systems Engineering Office [SEO] and Engineering Cost Office [ECO]) will evaluate the available manpower and skills from both offices and provide a recommendation to the SMO Director on who should be assigned to lead the independent evaluation work. The SMO Director will make the SMO Chairperson assignment for the independent evaluation.

5.5.4 During the life of the program/project, evaluation reviews (e.g., IA, NAR, IAR) will be identified in the program/project plan or special reviews (e.g., Termination Review) may be requested by the Governing Program Management Council (GPMC).

5.5.5 The SMO will lead the evaluation reviews or special reviews at the Center. The SMO Director will assign a person within the SMO to chair the review. Review team members will be selected outside the advocacy chain of the program/project, possibly from a predefined list of available candidates within the Center's various organizations. If the appropriate skills cannot be found within the Center, those skills will be sought (e.g., IPAO) or procured (e.g., contractor) from outside the Center.

5.5.6 The Review Team Chairperson will develop an Evaluation Plan that identifies the objectives, schedule, and required data for conducting the review. The Review Team Chairperson will then coordinate the Evaluation Plan with the GPMC and also with the program/project management.

Appendix B presents a typical format for the Evaluation Plan. Evaluation Plans are not limited to this example and will be formatted and prepared to meet specific review requirements. The Evaluation Plan shall be signed by 1) the Review Team Chairperson, 2) the manager of the program/project being reviewed, 3) the GPMC Chair or designee, and 4) the SMO Director. The Evaluation Plan shall be numbered using the numbering system identified in SMO-OI-03.

5.5.7 Upon concurrence from the GPMC and after obtaining the required review data, the Review Team will conduct the review per the criteria and objectives outlined in the Evaluation Plan.

5.5.8 The Review Team will identify findings from the review, prepare recommendations, and coordinate those findings and recommendations with the program/project management.

5.5.9 The Review Team Chairperson will status the review findings, recommendations, and program/project responses with the SMO Director prior to reporting them to the GPMC. The Review Team Chairperson will also refer to MPG 7120.4 for statusing the MSFC PMC before going to the GPMC.

5.5.10 Final findings, recommendations, and program/project responses will be reported back to the GPMC by the Review Team Chairperson and program/project manager. For any actions assigned back to the Review Team by the GPMC, the Review Team Chairperson will track those actions and report the status.

Appendix C presents a typical format for the Evaluation Report. Evaluation Reports are not limited to this example, but should be formatted and prepared to meet specific review reporting requirements. The Evaluation Reports shall be numbered using the numbering system in SMO-OI-03.

6. NOTES

NONE

7. SAFETY PRECAUTIONS AND WARNING NOTES

NONE

8. APPENDICES, DATA, REPORTS, AND FORMS

Appendix A	SMO OPR Documentation List
Appendix B	Evaluation Plan Example
Appendix C	Evaluation Report Example

9. RECORDS

The ECO’s records shall consist of those cost analysis products that are formally used in a major program/project decision making process by program, project, Center, or Agency management. The cost analyses shall be records under such circumstances as:

1) When they are the result of major program/project evaluation reviews such as IA, NAR, or IAR.
2) When used as a part of other major formal program/project reviews that lead to significant program/project decisions.
3) When used in a decision review to the PMC.

4) When used directly in a decision process by the program/ project management, Center Director, or Headquarters.

NAFCOM and other tools and documents used within the ECO are not records.

The SEO's records shall consist of those program/project evaluation (i.e. IA, NAR, IAR), special, periodic or termination review plans and reports.

The PMC Secretariat records shall consist of meeting minutes for each MSFC PMC, Microgravity Research PMC, or Space Transportation PMC. The meeting minutes will include a summary of the meeting discussion, actions assigned, and a copy of all presentation material.

The Export Control records shall consist of annual Export Control training records (e.g., Center Export Administrator [CEA],Assistant Center Export Administrator [ACEA], Center Export Representative [CER]), Export Clearance Information Sheets (ECIS), and annual Export Control audit reports.

Record	Location	Retention Time	Disposition	Remarks
Evaluation Review, Special Review, Periodic Review, or Termination Review **Plans**	SMO Files	15 Years	Destroy	

Record	Location	Retention Time	Disposition	Remarks
Evaluation Review, Special Review, Periodic Review, or Termination Review **Reports**	SMO Files	15 Years	Destroy	
Cost Analyses	SMO Files	5 Years	Destroy	
Annual Review of Process	SMO Files	3 Years	Destroy	
Record of Process Approval	SMO Files	3 Years	Destroy	
Preventive/ Corrective Actions	SMO Files	3 Years	Destroy	
Record of Export Control Annual CEA, ACEA, CER, Management, and General Training	SMO Files	5 Years	Destroy	
ECIS signed by CEA or ACEA	SMO Files	5 Years	Destroy	
Annual Export Control Audit Report	SMO Files	5 Years	Destroy	
PMC Secretariat Meeting Minutes	SMO Files	30 Years	Destroy	

Above Quality Records shall be controlled in accordance with SMO-OI-03.

10. TOOLS, EQUIPMENT, AND MATERIALS

NONE

11. PERSONNEL TRAINING AND CERTIFICATION

NONE

12. FLOW DIAGRAM

See Section 5.0

Appendix A
SMO OPR Documentation List

A.1 ISO Directives:

1) MPD 2190.1	MSFC Export Control Program
2) MPG 2190.1	MSFC Export Control Program
3) MPG 7120.1	Program/Project Planning
4) MWI 8050.1	Verification of Hardware, Software, and Ground Support Equipment for MSFC Projects
5) MPG 8060.1	Flight Systems Design/Development Control

A.2 MSFC Handbooks & Guidelines:

1) MSFC-HDBK-1912	System Engineering Handbook
2) MSFC-HDBK-2221	Verification Handbook
3) MSFC-HDBK-670	Guidelines For Protoflight Testing
4) MSFC-HDBK-3173	Project Management/Systems Engineering Handbook

A.3 MSFC Data Requirement Descriptions (DRD):

STD/MA-PMP	Project Management Plan
STD/MA-TPR	Technical Performance Report
STD/MA-WBS	Work Breakdown Structure & WBS Dictionary
STD/SE-ICD	Interface Control Documents
STD/SE-IRD	Interface Requirements Documents
STD/SE-RFM	Requirements Flowdown Matrix
STD/SE-SEMP	System Engineering Management Plan
STD/SE-SSDD	System/Segment Design Definition Document
STD/VR-REQ	Verification Requirements Information/Document
STD/VR-VC	Verification Compliance Information/Document
STD/VR-VP	Verification Planning Information/Document
STD/VR-VR	Verification Reports
STD/VR-VSC	Verification Success Criteria Information/Document

Appendix B
Evaluation Plan Sample

(IA, NAR, IAR, or Special Review)
PLAN
For
TBD Program/Project

PLAN OUTLINE

1. Date and Location

The date and location of the review should be included. For most MSFC programs/projects, the review will be held on-site at MSFC.

2. Draft Agenda

Include as many details as are known.

3. Panel Membership

The panel will typically have a MSFC SMO co-chair and a technical co-chair. The SMO co-chair will handle all administrative functions associated with the review and insure that the structure and content of the review is followed as outlined in NPG 7120.5. The SMO Director and the SMO panel co-chair will establish a review team comprised of highly knowledgeable specialists from organizations outside of the advocacy chain of the program or project being reviewed. Outside consultants will be utilized where needed. The IPAO at LaRC will be contacted to help identify specialists from other NASA centers when needed. This team will conduct the review, discuss all findings with the program or project management, and present findings to the MSFC PMC. To the extent possible, continuity of the team membership will be maintained from IA to NAR and carried forward to the IAR.

4. Purpose

4.1 NAR Purpose

The approval subprocess for all programs and selected projects must include a NAR, which provides an independent verification of a candidate program or project’s plans, Life Cycle Cost status, and readiness to proceed to the next phase of the program’s life cycle. The purpose of this NAR is to assess the readiness (programmatic and management) of the TBD Program/Project to begin in FY TBD.

4.2 IAR Purpose

The MSFC PMC shall establish procedures to ensure that it remains cognizant of the status and performance of the programs and projects over which it has responsibility. An IAR provides validation of conformance to the PCA, Program Plan, and Project Plan, where applicable.

4.3 IA Purpose

An IA is performed in support of the MSFC PMC oversight of approved programs/projects.

The IA is a validation of an advanced concept typically conducted in the formulation subprocess.

5. Content

5.1 NAR Content

A NAR provides the MSFC PMC with an independent verification and evaluation of a program or selected project’s readiness to proceed. The NAR shall assess the following:

a. Compatibility with NASA/MSFC policy and baseline documentation.

b. Clarity of goals and objectives.

c. Thoroughness/realism of technical plans, schedules, and cost estimates (including reserves and descoping options).

d. Adequacy of management plans, including organizational structure and key personnel credentials.

e. Technical complexity, risk assessment, and risk mitigation plans.

To effectively support the MSFC PMC in its recommendations for progressing, the review team shall gain a thorough understanding of the present status and position of the program or project, as well as an understanding of the major tradeoffs and alternatives

explored by the design team. The program or project shall brief the following information to the NAR panel:

f. Program/project background.

g. Scientific and technological objectives.

h. Formulation and implementation plans and schedules.

i. Documentation and agreements status.

j. Management structure and acquisition strategies.

k. Life Cycle Cost estimates which includes the following:

(1) Funding resource requirements.
(2) Reserves allocations.
(3) Workforce requirements.
(4) Infrastructure requirements.
(5) External contributions or partnering efforts.

l. Program risk assessment and plans for mitigating risks.

5.2 IAR Content

An IAR shall provide for the following:

a. Assess progress/milestone achievement against original baseline.

b. Review and evaluate the cost, schedule, and technical content of the program over the entire life cycle.

c. Assess technical progress, risks remaining, and mitigation plans.

d. Determine if any program deficiencies exist which result in revised projections exceeding predetermined thresholds.

To accomplish this, the IAR team will assess progress to date against the plan to date, incorporating the use of performance indicators and milestone success criteria, as well as assessing risk for completing future efforts as presently planned. The

program/project presentation to the IAR team should include, at a minimum, the following:

e. Quick overview of program/project.

f. Status and changes since last NAR or IAR of the following:

(1) Primary goals and objectives
(2) Scientific and technical objectives that drive mission requirements and implementation plans.
(3) Implementation plans.
(4) Progress against performance indicators and productivity measures (technical, cost, and schedule).

g. The SMO Director, with process responsibility, along with the MSFC CFO and MSFC Center Director shall establish standards to ensure continuity of reviews and for their conduct.

h. The program or project manager will ensure that a current PCA, Program Plan, and project baseline is available to the IAR team to facilitate the conduct of the assessment.

5.3 IA Content

a. Provides the GPMC with an in-depth, independent validation of the advanced concepts, program or project's requirements, performance, design integrity, system/subsystem trades, Life Cycle Costs, realism of schedule, risks and risk mitigation approaches, and technology issues.

b. Provides suggestions of alternative system and/or subsystem design approaches that offer potential for reduced costs and risks or improved system performance.

6. Outcome

6.1 NAR Outcome

The findings of the review shall document each of the areas listed in Section 5.1 above. The conclusions and recommendations will be used by MSFC Senior Management in deliberations and

recommendations for moving the program or project into the next phase of its development.

6.2 IAR Outcome

The IAR shall support the deliberative process of the GMPC by providing realistic status on Agency/Center commitments. The IAR team report shall contain the following:

a. Recommendations to the GPMC relative to compliance with the PCA, Program Plan, and Project Plan, where applicable.

b. Recommendations for additional reviews or individual program/project briefings that the IAR team deem necessary.

c. A recommendation on the advisability of continuing the program. This shall specifically include a recommendation as to whether or not a Termination Review is required.

d. Minority reports in the event that a team consensus is not reached.

6.3 IA Outcome

The results of the IA are used in support of the GPMC in its deliberative process for developing the following:

a. Continuing further formulation of the program or project.

b. Program/project budget decisions.

7. Reference Documents

NPG 7120.5
PCA, Program Plan, Project Plan and other similar support documentation.

Appendix C
Evaluation Report Sample

(IA, NAR, IAR, or Special Review)
REPORT
For
TBD Program/Project

REPORT OUTLINE

TEAM MEMBERS

1.0 INTRODUCTION

Review Charter
Scope of review
Methodology
- Approach
- Documents reviewed
- Project reviews / meetings attended

2.0 PROJECT DESCRIPTION / BACKROUND

Enterprise
Lead Center
Project Manager
PCA status
Project Plan status
Project objectives
Schedule
Budget
System description
Current status

3.0 EXECUTIVE SUMMARY

Statement reporting contract and/or CWC/SPA modifications (requirements changes)
Summary of evaluation regarding PCA and / or Project Plan compliance
Summary statement regarding budget metric (within budget or not)
Summary statement regarding schedule metric (on schedule or not)
Summary of technical performance
Changes since last review
Statement regarding effectiveness of management team processes, issue resolution and communication methodology
Statement regarding risk management and mission assurance processes

4.0 COST

Budgeted cost profile
Life cycle cost

Workforce profile
Workforce / budget comparisons
Reserves analysis
Current Project cost risk mitigation approach
Review assessment of cost risk
Recommendations to the Project

5.0 SCHEDULE

Baseline schedule
Planned versus actual schedule milestones
Critical path assessment
Current Project schedule risk mitigation approach
Review assessment of schedule risk

6.0 TECHNICAL ELEMENTS

Assessment of technical progress (by discipline)
Identification of technical issues / concerns
Current Project technical risk mitigation approach
Review assessment of technical risk
Recommendations to the Project

7.0 PROJECT MANAGEMENT

General
PCA / Project Plan compliance
Requirements definition / verification / traceability
Project risk management approach / Risk Management Plan
Configuration control (requirements, design, documentation, hardware, software)
Safety approach / Safety Plan
NPG 7120.5 compliance; methodology utilized and effectiveness achieved
Review assessment of project management risk
Recommendations to the Project

8.0 SUMMARY / RECOMMENDATIONS TO THE PMC

Summary of findings / risks ranked by severity (hazard report-type risk assessment matrix)
Recommendation on the advisability of continuing the program
Recommendation for additional reviews or project briefings that the Review team deems necessary

9.0 MINORITY REPORTS

Minority reports in the event the team cannot reach consensus.